Adv.

Pollen Antigens Lederle

FOR PROPHYLAXIS OF

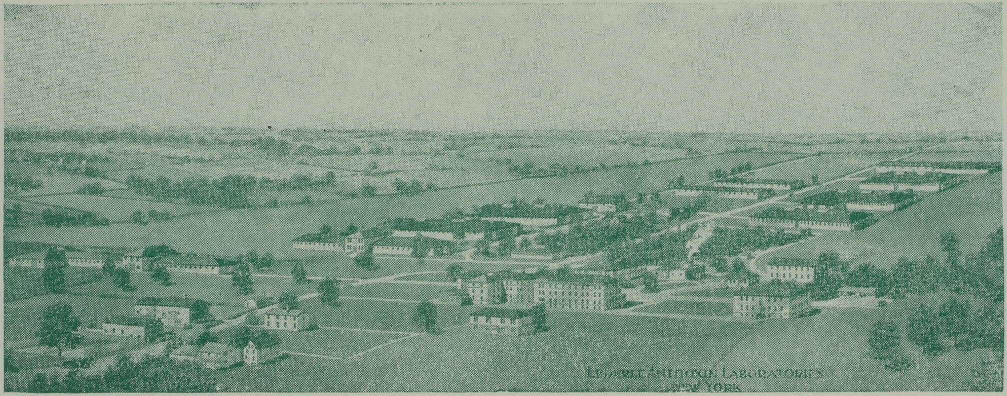
HAY FEVER

9/19/25

Presented by

The McKennan Pharmacy

HAY-FEVER



Lederle Antitoxin Laboratories, Pearl River, Rockland County, N. Y.,
where the original work of preparing glycerolated pollen antigens in stable and standardized solution was carried out in 1914.

Hay-Fever

Its Diagnosis and Treatment with

Pollen Antigens*

Illustrated

LEDERLE ANTITOXIN LABORATORIES
NEW YORK
1925

* *The name "Pollen Antigen" denotes the product of the Lederle Antitoxin Laboratories*

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Published, March, 1925

Printed in the United States of America by
THE EXPORT PRESS, NEW YORK

Preface

THE object of this little book is to give the busy practitioner the important facts concerning the pollens that cause hay-fever; to explain to him briefly the approved methods of making diagnostic tests and administering the pollen treatment; and to provide him with a handy reference so that he may readily know the various pollens causing hay-fever at different seasons of the year in his own locality.

In submitting this book to the medical profession, our aim has been to state concisely and accurately the present understanding concerning the clinical application and value of the pollen therapy of hay-fever; and to present the subject in such a manner as to be of the most assistance to the practitioner.

A special study has been made of the botanical flora in each section of the country, and the hay-fever pollens of primary and secondary importance in the different geographical areas have been tabulated according to their season of pollination.

The line drawings of cocklebur *(page 31)*, giant ragweed *(page 46)*, marsh elder *(page 43)*, mugwort *(page 40)*, ragweed *(page 43)*, sage brush *(page 40)*, sheep sorrel *(page 16)*, spiny amaranth *(page 22)*, Western ragweed *(page 49)*, Western water hemp *(page 29)*, and yellow dock *(page 17)*, are from ADA GEORGIA'S "Manual of Weeds," published by the Macmillan Company, New York. We wish to express here our thanks for the kind permission to reproduce these copyrighted drawings. The photoengravings of the grasses *(pages*

10, 13, 14, 15, 18 and 19) are from Farmer's Bulletin, "Important Cultivated Grasses," published by the United States Department of Agriculture, through whose courtesy they are here reproduced. The line drawing of green sage and pasture sage *(page 37)* are from the monograph by HALL and CLEMENTS entitled, "The North American Species of Artemisia, Chrysothamnus and Atriplex," published by the Carnegie Institution of Washington, through whose courtesy they are here reproduced. The other photographs are original and most of them were especially made for this book.

LEDERLE ANTITOXIN LABORATORIES.

March.
1925

Contents

CHAPTER I PAGE

Relation of Pollens to Hay-Fever . . . 1

Pollen Antigens (Lederle), Wind-borne Pollens, Sensitization, Characteristics of Hay-Fever Pollens, Insect-borne Pollens, Harmless Plants and Trees, Pollens of Cereal Grains.

CHAPTER II

Diagnostic Tests 10

How to make a skin test, Interpretation of skin reactions.

CHAPTER III

Pollen Treatment 15

Glycerolated Pollen Antigens (Lederle), Standardization, Prophylactic (Preseasonal) Treatment, Treatment of Attack.

CHAPTER IV

Dosage 24

Interval between doses, Desensitization not permanent.

CHAPTER V

Clinical Results 27

Advantages of Pollen Antigen Treatment.

CHAPTER VI

Causes and Seasons of Hay Fever . . 30

United States

New England States, Eastern States, Southern States, Central States, Middle Western States, Rocky Mountain States, Southwestern States, Pacific States.

PAGE

Canadian Provinces

Nova Scotia, Prince Edward Island, New Brunswick, Quebec, Ontario, Manitoba, Saskatchewan, Alberta, British Columbia.

Other Countries

Africa, Alaska, Australia, British Isles, Central America, China, Hawaii, New Zealand, Philippine Islands, San Salvador, South America, West Indies, Western Europe.

CHAPTER VII

List of Pollen Antigens (Lederle) . . 50

Packages.

Botanical Species of Hay-Fever Plants with Their Common English Names . 54

Index of States and Other Countries . 56

Hay-Fever

CHAPTER I

Relation of Pollens to Hay-Fever

The records of the American Hay-Fever Prevention Association[1] show that about 1 per cent of the population of the United States is susceptible to hay-fever (approximately 1,250,000 persons being affected) and that the number is steadily increasing. Because of the nature of its symptoms, hay-fever is probably more dreaded by its victims than many of the more serious diseases. The congestion of the nostrils with profuse nasal discharge, the difficulty of nasal breathing, the itching of the eyes, the sudden and often violent attacks of sneezing and the sleepless nights, to which are frequently added more or less severe asthmatic attacks, form a combination of distressing symptoms which are aggravated by the probability of their annual recurrence.

The medical world is indebted to DUNBAR[2] for the exhaustive scientific proof in 1903 of the specific action of pollen as the cause of hay-fever. DUNBAR'S work opened the way to a new method of treatment founded upon immunology. He isolated from the pollen what he thought was a true toxin, but later investigations established the fact that the active substances of the pollens are proteins with active antigenic properties.

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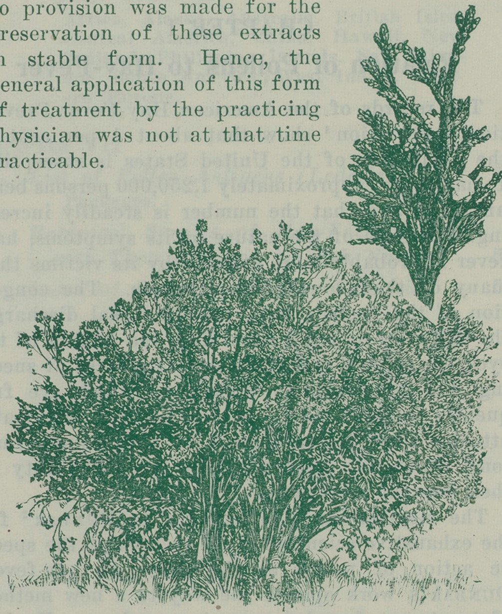
1 SCHEPPEGRELL, W.: Hay-Fever: Its Relation to Seasons, Occupations, Sex and Color, *N. Y. Med. Jour.*, Dec. 9, 1916, p. 1127.

2 DUNBAR, W. P.: Zur Ursache und Specifischen Heilung des Heufiebers, Muenchen, 1903.

As early as 1911 medical research workers had successfully treated hay-fever patients with antigenic extracts of pollens. This early work was done with freshly prepared aqueous extracts and no provision was made for the preservation of these extracts in stable form. Hence, the general application of this form of treatment by the practicing physician was not at that time practicable.



Mountain Cedar *(Juniperus sabinoides)*

Pollen Antigens (Lederle)

In 1914, researches conducted in the Lederle Antitoxin Laboratories resulted in the perfection of glycerolated pollen antigens in stable and standardized solution. The physician for the first time was thus afforded a means for the scientific treatment of his hay-fever patients.

Pollen Antigens (Lederle) are prepared by extracting the mature pollen grains in 66⅔ per cent glycerol and 33⅓ per cent saturated sodium chloride solution. This method of preparing Pollen Antigens (Lederle) has been continuously used for eleven years, during which time it has proved to produce *uniformly potent and stable pollen antigens.* These antigenic solutions are standardized against antipollen serum by the complement fixation method which accurately determines the antigenic activity of the pollen protein. *This ensures an active and potent product.*

Cottonwood blossoms
(Populus macdougali)

Wind-Borne Pollens

Hay-fever is a condition of hypersensitiveness to pollen proteins and is produced primarily by the inhalation of wind-borne pollens. However, only those wind-borne pollens that are inhaled during normal respiration cause true hay-fever. Thus, SCHEPPEGRELL[3] says:

> "While there are many plants whose pollen may cause the hay-fever reaction when applied to the nostrils, *only pollens which float in the air and can reach the nostrils in the course of normal respiration are responsible for true hay-fever.*"

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[3] SCHEPPEGRELL, W.: Hay-Fever and Hay-Fever Pollens, *Arch. Int. Med.*, June 15, 1917, p. 959.

This fact was definitely established[4] by means of atmospheric-pollen plates which were exposed daily, during the hay-fever season, at various stations of the American Hay-Fever Prevention Association and also near the residences of the hay-

Black Walnut blossoms *(Juglans nigra)*

fever patients. The plates were coated with glycerin and exposed for periods of twenty-four hours and then taken to the laboratory, stained,

[4] SCHEPPEGRELL, W.: Hay-Fever and Its Relation to 100 of the Most Common Plants, Trees and Grasses, *Med. Rec.*, Aug. 11, 1917, p. 230.

examined miscroscopically and the pollens identified.

Sensitization

Although wind-borne pollen is so widely distributed that the mucous membranes of all persons

Ash blossoms *(Fraxinus toumeyi)*

come in contact with it, yet only those who are sensitized develop hay-fever. Most people can breathe pollens in large amounts with no more irri-

Shad Scale
(Atriplex canescens)

tation than is caused by any other dust. But in the case of a person who is sensitive to pollen, the pollen when inhaled produces symptoms of hay-fever. Each hay-fever patient represents a state of sensitiveness to a definite pollen, as can readily be proved by cutaneous tests with extracts of pollen. Just what causes this sensitiveness is largely unknown; neither do we know exactly why some persons are sensitive to certain pollens while others are not. Many times the sensitiveness to pollen protein increases with an increase in the amount of pollen inhaled, with naso-pharyngeal disease or obstruction, with the lowering of a person's vitality, and there also seems to exist an hereditary sensitiveness to hay-fever in certain persons. But the sensitiveness often increases without known cause.

Characteristics of Hay-Fever Pollens

Pollens are carried from one plant to another either through the agency of the wind or by insects. The principal and most important fact in connection with hay-fever is that *only those pollens which are carried by the wind and which are therefore in the air can cause true hay-fever.* For complete list of hay-fever plants, see pages 54-55.

Wind-pollinated plants are distinguished by their inconspicuous flowers which are devoid of scent or odor; their pollen is shed in large amounts and is light and buoyant.

Insect-Borne Pollens

On the other hand, insect-pollinated plants are characterized by their bright-colored, conspicuous flowers which have a sweet scent or odor; their pollen is heavy and viscid and is shed very sparingly. *Insect-pollinated plants are not an important factor in hay-fever,* because their pollen is never present in the atmosphere in sufficient amounts to reach the nostrils in the course of normal respiration.

The fact that *true hay-fever is caused by the inhalation of wind-borne pollens only,* eliminates a long list of insect-pollinated plants and trees which are popularly supposed to cause hay-fever.

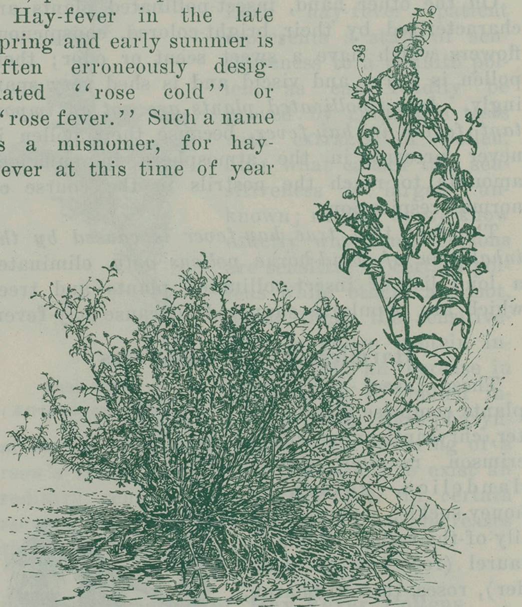
Harmless Plants and Trees

These insect-pollinated plants comprise alfalfa, aster, chrysanthemum, clover, crimson rambler, dahlia, dandelion, goldenrod, honey-suckle, jonquil, lilac, lily-of-the-valley, mountain laurel (rose bay or oleander), roses, rose of Sharon, spirea, sugar beet, sunflower, white daisy, and yellow daisy. The insect-pollinated trees which are harmless in hay-fever include the common fruit trees (apple, apricot, peach, pear, plum) and most of

Oak blossoms
(Quercus alba)

the ornamental flowering trees, such as catalpa, crepe myrtle, dogwood, locust and magnolia.[5] Moreover, SCHEPPEGRELL states that several trees whose pollen is wind-borne are negative in hay-fever, including the arbor vitæ, cypress, fir, hemlock, pine and spruce.

Hay-fever in the late spring and early summer is often erroneously designated "rose cold" or "rose fever." Such a name is a misnomer, for hay-fever at this time of year



Rabbit Bush *(Franseria deltoidea)*

is not caused by rose pollen but by pollen from the grasses. In like manner, fall hay-fever is popularly attributed to pollen of the goldenrod,[6] while in real-

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[5] SCHEPPEGRELL, W.: Hay-Fever and Asthma, Lea and Febiger, Philadelphia, 1922.

[6] SCHEPPEGRELL, W.: The Goldenrod Is Not Responsible for Hay-Fever, *U. S. Pub. Health Reports*, July 21, 1916.

ity it is caused in the vast majority of cases by ragweed.

There are certain insect-pollinated plants whose pollen will undoubtedly produce hay-fever symptoms if directly inhaled, but *such pollens are never found in the air in any great quantity and so are practically not a factor in the hay-fever situation.* The pollen of insect-pollinated plants may precipitate an attack of hay-fever under exceptional circumstances—such, for example, as where the flowers are deliberately smelled as might be done particularly by children, or where the plants are grown in great profusion in close contact with the patient, or even in some cases where the flowers are used for room decoration. But such symptoms would not long persist.

Sweet Vernal Grass
(Anthoxanthum odoratum)

Pollens of Cereal Grains

The pollen of corn, in spite of its toxicity, is rarely responsible for hay-fever; because its size is so great that it cannot travel far; so that only by close proximity to a corn field can hay-fever be induced. Rye and wheat also have large pollen grains and, therefore, are of little practical importance as a cause of hay-fever. The cereals, however, including rye, wheat, oats and corn, may constitute a local cause of hay-fever in some States.

CHAPTER II

Diagnostic Tests

Sensitiveness to pollens can be determined by applying diagnostic skin tests. For this purpose, extracts prepared from the individual species of pollens that cause hay-fever should be used. Since the botanical flora varies greatly in different sections of the country and with the seasons of the year, it is essential for the physician:

1. *To ascertain the exact date when his patient's hay-fever symptoms appear.*
2. *To acquaint himself with the hay-fever plants most common in the locality where his patient lives.*

Orchard Grass
(Dactylis glomerata)

This information will be found on pages 30 to 48, where the hay-fever plants of individual states are listed. The tables on these pages contain in the left-hand column the common and botanical names of the plants, and in the right-hand column are given the months of the year during which the individual plants bloom. These months correspond to the time when the hay-fever symptoms occur.

For example, a hay-fever patient living in Massachusetts has symptoms of hay-fever from May to September. This corresponds to the pollinating season of June grass. Therefore, by applying a June grass skin test, if a positive reaction occurs such a patient should be given the desensitizing treatment with June grass pollen antigen.

DIAGNOSTIC SKIN TEST
(Puncture Method)
Expelling Pollen Diagnostic from capillary tube to forearm.

How to Make a Skin Test

Puncture Method: Cleanse the flexor surface of forearm with alcohol or ether. After evaporation of the alcohol or ether, place a drop of Pollen Diagnostic upon the cleansed skin.

The Diagnostic material is expelled from glass capillary tubes.

Holding the sterile needle nearly parallel with the skin, make about six oblique pricks or shallow punctures through the epidermis by pressing the point of the needle through the drop of Diagnostic. Confine the punctures to an area not more than one-eighth (1/8) of an inch in diameter.

Sufficient Diagnostic to produce a positive reaction (urticarial wheal) in susceptible persons will be carried beneath the skin by these multiple punctures. The surplus Diagnostic on the surface of the skin may be wiped off immediately, thus making it possible to observe the reaction as it is forming.

A positive reaction consisting of an urticarial wheal or white elevation of the skin will appear in

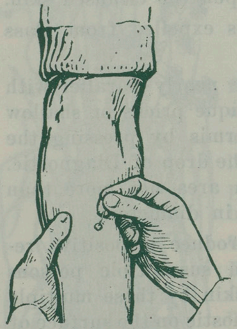
sensitive persons in 15 to 30 minutes. When it begins to form, the wheal is often irregular in outline, with many radiating portions. These gradually coalesce, leaving a larger irregular wheal.

Scratch Method: This is not as delicate a test as the puncture method, and does not as readily permit of observing the formation of the urticarial wheal.

Cleanse the skin as above described, and, with sterile needle, make a small scarification about one-eighth (1/8) of an inch long through the Diagnostic material on the flexor surface of the forearm. A second scarification may be made as a control. At the end of one-half hour, wipe off the Diagnostic and note the reaction, comparing it with the control.

Interpretation of Skin Reactions

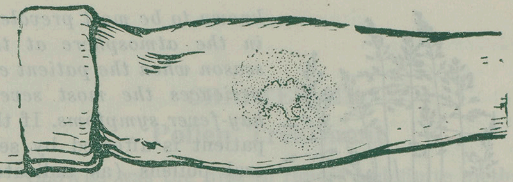
The pollens which are not the cause of the patient's hay-fever will produce no reaction. A *positive reaction* consists of an urticarial wheal or white raised area of the skin, which looks like a hive or mosquito bite surrounding the scarification. The wheal is usually surrounded by a zone of redness.



DIAGNOSTIC SKIN TEST (Puncture Method)

Making multiple punctures with needle point pressed through drop of Pollen Diagnostic.

The degree of the reaction is determined entirely by the size and shape of the urticarial wheal. The surrounding zone of erythema or redness may be disregarded. For a reaction to be considered positive there must be a true urticarial wheal. The greater the irregularity in outline of the



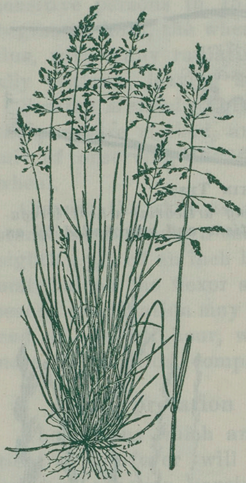
DIAGNOSTIC SKIN TEST

Positive pollen reaction, showing urticarial wheal irregular in outline with radiating portions and surrounded by an erythematous area.

urticarial wheal, the greater is the sensitiveness of the patient to that particular pollen. Thus, an urticarial wheal with pseudopods (irregular, radiating portions), is of greater significance than a wheal having a more or less regular outline without pseudopods. The swollen area (urticarial wheal) may be as large as one to two inches (25 to 50 millimeters) in diameter, but more often is about ⅝-inch (15 millimeters). It is often associated with intense itching of the skin.

This skin test indicates which pollens are the cause of hay-fever in the individual case. *Several skin tests should be made, using those pollens which are*

Perennial Rye Grass
(Lolium perenne)



June Grass
(Blue Grass, *Poa pratensis)*

known to be most prevalent in the atmosphere at the season when the patient experiences the most severe hay-fever symptoms. If the patient is affected by several pollens (as indicated by positive skin reactions produced by more than one pollen), the degree of reactions will distinguish between the pollens that affect the patient only slightly and those that are harmful and are responsible for the hay-fever symptoms. It is important to determine by these skin tests which pollen is the principal offender in causing the hay-fever symptoms, and treatment should be given with the pollen antigen corresponding to that pollen which gives the maximum positive reaction in the skin test.

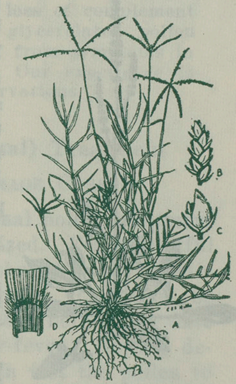
CHAPTER III

Pollen Treatment

CLOWES was the first to report a definite method of vaccination against hay-fever in this country; but to KOESSLER must be given the credit for placing the method of desensitization against hay-fever on a scientific basis.

Glycerolated Pollen Antigens (Lederle)

With the end in view of devising some method for preparing a uniformly stable product, we extracted pollen by various methods[7] and succeeded in preparing uniformly stable pollen antigens[8] by extracting the pure, mature pollen grains in 66⅔ per cent glycerol and 33⅓ per cent saturated sodium chloride solution. Such glycerolated pollen antigens proved to be remarkably stable and more potent than those obtained by any other method of extraction, for no loss in antigenic properties could be detected in the glycerolated pollen antigens after being stored in the icebox for twenty-two months.



Bermuda Grass
(Capriola dactylon)

[7] CLOCK, R. O.: Comparative Value of the Methods of Preparing Pollen Antigen. *J. Infec. Dis.*, Dec., 1917, p. 523.

[8] CLOCK, R. O.: A Stable Pollen Antigen. *J. Infec. Dis.*, Oct., 1917, p. 387.

Standardization

Moreover, we were able to accurately standardize Pollen Antigens (Lederle) against antipollen serum[9] by means of the complement fixation method, whereby the amount of antigenically active protein in the extract is definitely determined. This ensures their antigenic activity and provides for accurate dosage; for the protein in the glycerolated pollen antigens is preserved by the glycerol from autolytic deterioration, so that the original standardization is permanent.

The investigations of the United States Public Health Service[10] into the status of preventive treatment of seasonable hay-fever included an analysis of the various methods of preparing and testing pollen extracts. It will be of interest to physicians that this investigation confirms the work originally carried out in the Lederle Antitoxin Laboratories; also that the method for the preparation and testing of pollen antigens developed in the Lederle Antitoxin Laboratories and reported by Dr. Clock was found satisfactory, as shown by the following excerpt from the published report of the Public Health Service expert:

Sheep Sorrel
(Rumex acetosella)

[9] Clock, R. O.: Antipollen Serum for Standardization of Pollen Antigen, *J. Infec. Dis.*, Jan., 1918, p. 80.

[10] Bernton, H. S.: Treatment of Seasonable Hay-Fever and Some Possible Causes of Failure, *Jour. A. M. A.*, May 5, 1923, p. 1301.

"CLOCK is deserving of much credit for calling attention to the fact that chemical analysis fails to demonstrate the antigenic qualities of pollen extracts. Such analysis reveals only the amount of pollen protein present in solution. CLOCK has shown that a practical method of determining the antigenic properties of pollen extract is by means of the complement fixation test. . . . He has, furthermore, devised a method of preparing a stable antigen by the use of concentrated salt solution and glycerol. Pollen extracts, prepared by his method, have remained for fourteen months without loss of complement binding capacity. With his glycerolated pollen antigen CLOCK obtained relief from symptoms in 84 per cent of 1,578 cases. Our experience is confirmatory of CLOCK'S observations."

Yellow Dock
(Rumex crispus)

Prophylactic (Preseasonal) Treatment

(A) For the Average Case

The importance of preseasonal pollen treatment cannot be too strongly emphasized. For successful desensitization, it is essential that the prophylactic treatment with Pollen Antigen (Lederle) be started about six to eight weeks before the date of the expected attack of hay-fever. Having determined by the diagnostic skin test the pollen to which the person is most sensitive, preseasonal treatment is carried out by giving a complete

Timothy
(Phleum pratense)

series of fifteen doses of Pollen Antigen (Lederle) prepared from the corresponding pollen that gave the maximum positive reaction in the diagnostic skin test.

The antigen is administered *subcutaneously*, preferably in the arm over the insertion of the deltoid muscle. In making the subcutaneous injection, care should be used to keep the needle from penetrating a subcutaneous vein; otherwise the sudden entry of even a small amount of foreign protein (pollen antigen) may produce an anaphylactoid shock in a person sensitive to pollen.

The complete preseasonal treatment should be finished about one week before the date of the usual onset of hay-fever symptoms, in order to complete the schedule of dosage before the beginning of the pollinating season of the plants.

(B) Incompletely Protected Cases

In a small percentage of persons (about 10 per cent), the complete prophylactic pollen treatment will fail to establish complete desensitization, and such persons will not be fully protected from hay-

fever symptoms. Under these circumstances, the hay-fever attack may be delayed beyond its usual date of onset; or, the attack may occur at its regular time but the symptoms will be mild and will not last long. For such persons the following procedure is recommended:

First. If the interval between the completion of the regular fifteen-dose treatment and the appearance of hay-fever symptoms does not exceed one week, additional treatment may be given by injecting four or five doses of the special dose 16 at intervals of four or five days.

Second. If an interval of more than one week has elapsed, it is advisable to begin the additional treatment with dose 11 and progressively increase the doses at intervals of two or three days until finally four or five doses of the special dose 16 have been given.

(C) HYPERSENSITIVE CASES

A few persons (less than 1% of the cases reported) may be unusually sensitive to pollen protein, so that in the course of the pollen treatment some dose may produce a severe reaction. Such persons may often be successfully treated by injecting only one-half or one-quarter of each of the remaining doses, depending upon the reactions pro-

Redtop
(Agrostis palustris)

duced. After dose 15 has been reached and a fraction of it administered, the pollen treatment should be continued by injecting increasing amounts of dose 16 until finally the full amount of dose 16 is given. It is also often advisable to increase the interval between doses, especially if the reaction from the previous dose has not subsided.

In order to control the symptoms of protein reaction in hypersensitive persons, it is advisable to combine about 5 minims of epinephrin (1:1,000 solution) with each dose of pollen antigen. This can readily be done by drawing up the desired amount of epinephrin into the syringe containing the diluted pollen antigen. When administering the higher doses of pollen antigen (doses 11 to 15) it may be advisable to combine with each dose about 10 minims of the epinephrin solution. By constricting the arterioles, epinephrin shows absorption of the foreign protein (pollen antigen) and hence tends to minimize protein reactions.

Johnson Grass
(Sorghum halepense)

(D) Refractory Cases

In treating refractory cases—that is, those persons who in previous years have been benefited by the pollen treatment but who have not derived entire relief from their hay-fever symptoms—the de-

gree of protection may be materially increased by starting the pollen treatment ten weeks before the hay-fever season, and administering four or five doses of the special dose 16 at weekly intervals after the regular treatment of fifteen doses has been finished. This plan permits completing the regular treatment and the supplemental treatment with the extra doses before the date of the expected hay-fever attack; but the supplemental treatment may often be continued with benefit during the first few weeks of the pollinating season.

Lambs Quarters
(Chenopodium album)

Treatment of Attack

Preseasonal treatment yields by far the most satisfactory results and the physician should always impress upon his patient the advisability of taking the pollen treatment in advance of the hay-fever season. Nevertheless, many patients do not apply to their physician for relief from hay-fever symptoms until the actual attack of hay-fever has already begun.

In treating an attack of hay-fever, it is important always to start with dose 1; for it must be

borne in mind that the patient is already absorbing pollen from the atmosphere and if the higher doses of pollen antigen are used at first, the hay-fever symptoms may be temporarily aggravated and the patient's condition rendered worse instead of better.

The doses may be progressively increased and as many doses given as may be needed to control the attack. It may be necessary to administer the complete series of fifteen doses before the symptoms entirely disappear in some patients. Others may be benefited by three or four doses, with complete cessation of hay-fever symptoms after the eighth or ninth dose.

Usually, the doses may be given every day until a marked local reaction is produced; after that at intervals of two or three days. If any dose causes a severe reaction, as shown by an increase in the hay-fever symptoms, it is advisable to inject only one-half or even one-quarter of each of the subsequent doses, depending upon the degree of reaction.

Spiny Amaranth
(Amaranthus spinosus)

When used during the attack of hay-fever, Pollen Antigen (Lederle) has in many hundreds of cases alleviated the condition, as indicated by the symptoms being milder and the attack shorter. The physician can do much to advance the science of the pollen treatment of hay-fever if

he will use the opportunity afforded him, when administering pollen treatment during an attack of hay-fever, to impress his patient with the possibility of greater benefit to be derived from preseasonal treatment in the following year.

CHAPTER IV

Dosage

In the application of desensitization to hay-fever, it is important to always begin with small doses. The experiments of WEIL have proved that small amounts of proteins injected repeatedly will desensitize against small amounts, whereas the injection of large amounts of proteins will desensitize against large amounts. Hence, the method of gradually increasing the dose is theoretically correct and the person must be rendered refractory to large doses about the time of the expected attack of hay-fever. In its practical application this method has been proved to be correct. The scheme of dosage which we adopted for the glycerolated pollen antigens consists of 15 doses of a gradually increasing number of pollen units; the pollen unit having been established by NOON, who defined it as the equivalent of one millionth gram of pollen.

The actual strength of the various doses is as follows:

	Dose 1	contains	2½	pollen	units
	Dose 2	contains	5	pollen	units
	Dose 3	contains	10	pollen	units
	Dose 4	contains	20	pollen	units
	Dose 5	contains	25	pollen	units
	Dose 6	contains	30	pollen	units
	Dose 7	contains	50	pollen	units
	Dose 8	contains	75	pollen	units
	Dose 9	contains	100	pollen	units
	Dose 10	contains	150	pollen	units
	Dose 11	contains	250	pollen	units
	Dose 12	contains	375	pollen	units
	Dose 13	contains	500	pollen	units
	Dose 14	contains	750	pollen	units
	Dose 15	contains	1000	pollen	units
SPECIAL:	Dose 16	contains	1500	pollen	units

This higher dose 16 is provided for additional treatment of persons who are less sensitive to pollen protein and who are, therefore, more refractory to the desensitizing treatment; also when higher dosage than is contained in the complete series of 15 doses is desired.

Pollen Antigens (Lederle) are supplied undiluted; each vial of glycerolated antigen contains an accurately measured dose and is accompanied by a vial of diluent. The dilution is made by transferring (with a sterile syringe) the diluent to the vial containing the antigen. The physician makes the dilution at the moment of making the injection.

Interval Between Doses

The interval between doses is usually 48 hours; a convenient plan being to administer the antigen three times a week. The antigen is administered *subcutaneously,* preferably in the arm over the insertion of the deltoid muscle.

Desensitization Not Permanent

Since hay-fever is not an infectious disease but rather a state of hypersensitiveness to pollen protein, it is impossible to produce a true immunity against it. COOKE[11] and others have

[11] COOKE, R. A., FLOOD, E. P., and COCA, A.: Hay-Fever. The Nature of the Process and the Mechanism of the Alleviating Effect of Specific Treatment, *J. Immunol.*, Feb., 1917, p. 217.

Annual Saltbush
(Atriplex Wrightii)

Redroot Pigweed
(Amaranthus retroflexus)

pointed out that desensitization in hay-fever is not permanent or stable; freedom from symptoms lasts only as long as the antigen remains in combination with the tissue-antibodies. The state of desensitization is probably complete for only a few weeks after completion of the antigen treatment and gradually diminishes. Hence, it is essential to administer Pollen Antigen (Lederle) each year just previous to the hay-fever season in order to protect the person from hay-fever.

CHAPTER V

Clinical Results

Pollen Antigens (Lederle) were first prepared in 1914 and were described[12] in 1917. They have been used by physicians in all parts of the United States as well as Canada, Central America, Cuba, Porto Rico, South America, New Zealand, Australia, Canary Islands, Philippine Islands, China, British Isles, Norway, Sweden, Denmark, Holland, Belgium, France, Italy, Czecho-Slovakia, Bulgaria, South Africa, Mexico, New Zealand, Barbadoes, Bermuda, Turkey, Mesopotamia, etc.

It has been clinically demonstrated that hay-fever can, in many cases, be prevented or alleviated by treatment with the glycerolated pollen antigen prepared from the particular pollen to which the person is sensitive. In 1922, CLOCK reported[13] an analysis of 1,578 clinical reports from physicians in all sections of the United States who had used the glycerolated pollen antigen during five consecutive years. This analysis shows an average protection or relief from hay-fever symptoms in 84 per cent of cases with a re-

Russian Thistle
(Salsola pestifer)

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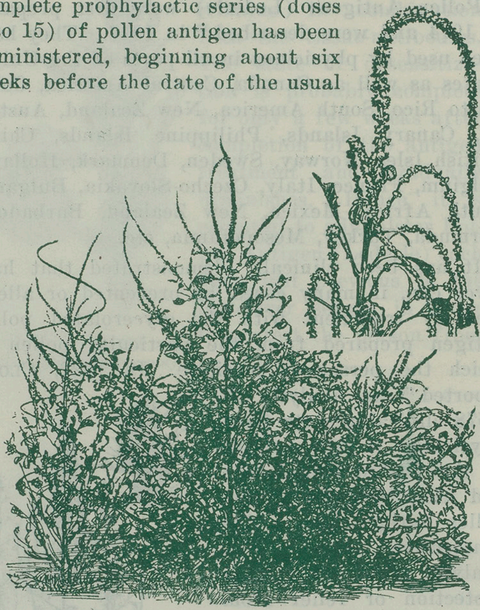
[12] CLOCK, R. O.: A Stable Pollen Antigen, *J. Infec. Dis.*, Oct., 1917, p. 387.

[13] CLOCK, R. O.: Hay-Fever and Its Treatment with Glycerolated Pollen Antigen, *Jour. Med. Soc., New Jersey,* March, 1922, p. 63.

markable uniformity of favorable results each year in every locality.

During the past eleven years, Pollen Antigens (Lederle) have been used for the treatment of hay-fever in more than 85,000 cases. When the complete prophylactic series (doses 1 to 15) of pollen antigen has been administered, beginning about six weeks before the date of the usual



Careless Weed ***(Amaranthus palmeri)***

attack of hay-fever, the results reported as favorable showed complete freedom from symptoms of hay-fever; or in those cases in which hay-fever did develop, the symptoms persisted for a few days only and were mild in character. Favorable results were also manifested in the possibility of

the patient remaining in his home town and at his usual work during the hay-fever season for the first time in years.

Western Water Hemp
(Acnida tamariscina)

Advantages of Pollen Antigen (Lederle) Treatment

The method of giving prophylactic injections of glycerolated pollen antigen early in the season seems to offer the best means of any method thus far advanced for the preventive treatment of hay-fever. It is no longer necessary to forsake one's business during the summer months and retire outside the zone of the offending pollinating plants. This was formerly the only rational therapeutic measure, but it was also expensive and time consuming. With the glycerolated pollen antigen treatment, however, the majority of hay-fever sufferers can be successfully desensitized and can continue to transact their business in their accustomed surroundings. Hence, the value of the glycerolated pollen antigen treatment would seem to be definitely established.

CHAPTER VI

Causes and Seasons of Hay-Fever

United States and Canadian Provinces

The hay-fever seasons vary in different sections of the country, being dependent upon the flowering periods of the various hay-fever plants which are governed by climatic conditions. In the following tables, the most important pollens from a hay-fever standpoint are shown in heavy face type, as well as being indicated by an asterisk (*). The others are usually of secondary or minor importance, except possibly in certain localities where they may assume primary importance.

New England States

(Maine, New Hampshire, Vermont, Massachusetts, Rhode Island, Connecticut)

(Canadian Provinces: Nova Scotia, Prince Edward Island, New Brunswick and Quebec)

NAME	TIME OF BLOOM (Hay-Fever Season)
Black Walnut *(Juglans nigra)* - - -	March - May
Cottonwood *(Populus macdougali)* - -	April - May
Oak *(Quercus alba)* - - - - - - -	April - May
Sweet Vernal Grass *(Anthoxanthum odoratum)* - - - - - - - - - -	April - July
Orchard Grass *(Dactylis glomerata)* -	April - Aug.
Sheep Sorrel *(Rumex acetosella)* - -	May - July
Yellow Dock *(Rumex crispus)* - - -	May - July
***June Grass** *(Poa pratensis)* - - - -	**May - Sept.**
***Timothy** *(Phleum pratense)* - - - -	**June - Aug.**
***Redtop** *(Agrostis palustris)* - - - -	**June - Sept.**
Lambs Quarters *(Chenopodium album)*	June - Sept.
Cocklebur *(Xanthium canadense)* - -	July - Sept.
***Ragweed** *(Ambrosia elatior)* - - - -	**Aug. - Oct.**
Giant Ragweed *(Ambrosia trifida)* - -	Aug. - Oct.

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*Pollens of primary importance.

For index of States and other countries, see page 56.

Cocklebur

(Xanthium canadense)

Eastern States

(New York, New Jersey, Pennsylvania, Delaware, Maryland, Virginia, West Virginia)

NAME	TIME OF BLOOM (Hay-Fever Season)
Black Walnut *(Juglans nigra)* - - -	March - May
Cottonwood *(Populus macdougali)* - -	April - May
Oak *(Quercus alba)* - - - - - - - -	April - May
Sweet Vernal Grass *(Anthoxanthum odoratum)* - - - - - - - - - -	April - July
Orchard Grass *(Dactylis glomerata)* -	April - Aug.
Sheep Sorrel *(Rumex acetosella)* - -	May - July
Yellow Dock *(Rumex crispus)* - - -	May - July
***June Grass** *(Poa pratensis)* - - - -	**May - Sept.**
***Timothy** *(Phleum pratense)* - - - -	**June - Aug.**
***Redtop** *(Agrostis palustris)* - - - -	**June - Sept.**
Lambs Quarters *(Chenopodium album)*	June - Sept.
Cocklebur *(Xanthium canadense)* - -	July - Sept.
***Ragweed** *(Ambrosia elatior)* - - - -	**Aug. - Oct.**
Giant Ragweed *(Ambrosia trifida)* - -	Aug. - Oct.

*Pollens of primary importance.

For index of States and other countries, see page 56.

Southern States

(North Carolina, South Carolina, Georgia, Florida, Alabama, Mississippi, Tennessee, Arkansas, Louisiana, Oklahoma, Texas)

NAME	TIME OF BLOOM (Hay-Fever Season)
Mountain Cedar *(Juniperus sabinoides)* The mountain cedar is found over a considerable part of Texas, Mexico and part of New Mexico.	Dec. - Feb.
Cottonwood *(Populus macdougali)* - -	Feb. - April
Black Walnut *(Juglans nigra)* - - -	March - May
Oak *(Quercus alba)* - - - - - - - -	April - May
Sweet Vernal Grass *(Anthoxanthum odoratum)* - - - - - - - - - -	April - July
Orchard Grass *(Dactylis glomerata)* -	April - Aug.
Perennial Rye Grass *(Lolium perenne)*	May - July
Sheep Sorrel *(Rumex acetosella)* - -	May - July
Yellow Dock *(Rumex crispus)* - - -	May - July
***June Grass** *(Poa pratensis)* - - - -	**May - Sept.**
***Bermuda Grass** *(Capriola dactylon)* -	**May - Sept.**
***Timothy** *(Phleum pratense)* - - - -	**June - Aug.**
***Redtop** *(Agrostis palustris)* - - - -	**June - Sept.**
Spiny Amaranth *(Amaranthus spinosus)*	June - Sept.
Lambs Quarters *(Chenopodium album)*	June - Sept.
***Johnson Grass** *(Sorghum halepense)* -	**June - Oct.**
Cocklebur *(Xanthium canadense)* - -	July - Sept.
Redroot Pigweed *(Amaranthus retroflexus)* - - - - - - - - - - - -	July - Sept.
***Ragweed** *(Ambrosia elatior)* - - - - -	**Aug. - Oct.**
***Giant Ragweed** *(Ambrosia trifida)* - -	**Aug. - Oct.**
Marsh Elder *(Iva ciliata)* - - - - -	Aug. - Oct.

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*Pollens of primary importance.

For index of States and other countries, see page 56.

Flowering top of cocklebur
(Xanthium canadense)

Central States

(Kentucky, Ohio, Indiana, Michigan, Illinois, Wisconsin)

(Canadian Province: Ontario)

NAME	TIME OF BLOOM (Hay-Fever Season)
Black Walnut *(Juglans nigra)* - - -	March - May
Cottonwood *(Populus macdougali)* - -	April - May
Oak *(Quercus alba)* - - - - - - - - -	April - May
Sweet Vernal Grass *(Anthoxanthum odoratum)* - - - - - - - - - -	April - July
Orchard Grass *(Dactylis glomerata)* -	April - Aug.
Sheep Sorrel *(Rumex acetosella)* - -	May - July
Yellow Dock *(Rumex crispus)* - - -	May - July
***June Grass** (Blue Grass, *Poa pratensis*)	**May - Sept.**
***Timothy** *(Phleum pratense)* - - - -	**June - Aug.**
***Redtop** *(Agrostis palustris)* - - - -	**June - Sept.**
Spiny Amaranth *(Amaranthus spinosus)*	June - Sept.
Lambs Quarters *(Chenopodium album)*	June - Sept.
Annual Saltbush *(Atriplex Wrightii)* -	July - Sept.
Redroot Pigweed *(Amaranthus retroflexus)* - - - - - - - - - - - -	July - Sept.
Cocklebur *(Xanthium canadense)* - -	July - Sept.
Russian Thistle *(Salsola pestifer)* - -	July - Sept.
***Ragweed** *(Ambrosia elatior)* - - - -	**Aug. - Oct.**
***Giant Ragweed** *(Ambrosia trifida)* - -	**Aug. - Oct.**
Western Ragweed *(Ambrosia psilostachya)* - - - - - - - - - - -	Aug. - Oct.

*Pollens of primary importance.

For index of States and other countries, see page 56.

Middle Western States

(Minnesota, Iowa, Missouri, North Dakota, South Dakota, Nebraska, Kansas)

(Canadian Province: Manitoba)

NAME	TIME OF BLOOM (Hay-Fever Season)
Black Walnut *(Juglans nigra)*	March - May
Cottonwood *(Populus macdougali)*	March - May
Oak *(Quercus alba)*	April - May
***Sweet Vernal Grass** *(Anthoxanthum odoratum)*	**April - July**
Orchard Grass *(Dactylis glomerata)*	April - Aug.
Sheep Sorrel *(Rumex acetosella)*	May - July
Yellow Dock *(Rumex crispus)*	May - July
***June Grass** (Blue Grass, *Poa pratensis)*	**May - Sept.**
***Timothy** *(Phleum pratense)*	**June - Aug.**
Redtop *(Agrostis palustris)*	June - Sept.
Spiny Amaranth *(Amaranthus spinosus)*	June - Sept.
Lambs Quarters *(Chenopodium album)*	June - Sept.
Annual Saltbush *(Atriplex Wrightii)*	July - Sept.
Redroot Pigweed *(Amaranthus retroflexus)*	July - Sept.
Sage Brush *(Artemisia tridentata)*	July - Sept.
Cocklebur *(Xanthium canadense)*	July - Sept.
Russian Thistle *(Salsola pestifer)*	July - Sept.
Green Sage *(Artemisia campestris)*	July - Oct.
Pasture Sage *(Artemisia frigida)*	July - Oct.
Western Water Hemp *(Acnida tamariscina)*	July - Oct.
***Ragweed** *(Ambrosia elatior)*	**Aug. - Oct.**
***Giant Ragweed** *(Ambrosia trifida)*	**Aug. - Oct.**
***Western Ragweed** *(Ambrosia psilostachya)*	**Aug. - Oct.**
Marsh Elder *(Iva ciliata)*	Aug. - Oct.

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*Pollens of primary importance.

For index of States and other countries, see page 56.

Green Sage

(Artemisia campestris)

Pasture Sage

(Artemisia frigida)

Rocky Mountain States

(Montana, Wyoming, Colorado, Utah, Idaho)

(Canadian Provinces: Saskatchewan and Alberta)

NAME	TIME OF BLOOM (Hay-Fever Season)
Black Walnut *(Juglans nigra)* - - -	March - May
***Cottonwood** *(Populus macdougali)* - -	**March - May**
Shad Scale *(Atriplex canescens)* - - -	Mar. - June
Oak *(Quercus alba)* - - - - - - - -	April - May
Rabbit Bush *(Franseria deltoidea)* - -	April - May
***Sweet Vernal Grass** *(Anthoxanthum odoratum)* - - - - - - - - - -	**April - July**
Orchard Grass *(Dactylis glomerata)* -	April - Aug.
Sheep Sorrel *(Rumex acetosella)* - -	May - July
Yellow Dock *(Rumex crispus)* - - -	May - July
***June Grass** *(Poa pratensis)* - - - -	**May - Sept.**
Timothy *(Phleum pratense)* - - - -	June - Aug.
***Lambs Quarters** *(Chenopodium album)*	**June - Sept.**
***Annual Saltbush** *(Atriplex Wrightii)* -	**July - Sept.**
***Redroot Pigweed** *(Amaranthus retroflexus)* - - - - - - - - - - -	**July - Sept.**
***Sage Brush** *(Artemisia tridentata)* - -	**July - Sept.**
Cocklebur *(Xanthium canadense)* - -	July - Sept.
***Russian Thistle** *(Salsola pestifer)* - -	**July - Sept.**
This weed is not a true thistle and does not have colored blossoms. It is of pale yellow color, growing two to three feet high, widely branched. The flowers are inconspicuous and greenish white. This weed is exceedingly abundant and pernicious in the Northwest.	
Mugwort *(Artemisia vulgaris)* - - -	July - Oct.
***Green Sage** *(Artemisia campestris)* - -	**July - Oct.**
***Pasture Sage** *(Artemisia frigida)* - -	**July - Oct.**
Ragweed *(Ambrosia elatior)* - - - -	Aug. - Oct.
Giant Ragweed *(Ambrosia trifida)* - -	Aug. - Oct.
***Western Ragweed** *(Ambrosia psilostachya)* - - - - - - - - - - -	**Aug. - Oct.**
Slender Ragweed *(Franseria tenuifolia)*	Sept. - Oct.

*Pollens of primary importance.

For index of States and other countries, see page 56.

Southwestern States

(Southwestern Texas, New Mexico, Arizona, Southeastern California)

NAME	TIME OF BLOOM (Hay-Fever Season)
Mountain Cedar *(Juniperus sabinoides)* The mountain cedar tree is found over a considerable part of Texas, Mexico and part of New Mexico.	Dec. - Feb.
***Cottonwood** *(Populus macdougali)* - -	**Feb. - April**
Arizona Walnut *(Juglans major)* - -	March - May
Arizona Ash *(Fraxinus toumeyi)* - -	March - May
***Shad Scale** *(Atriplex canescens)* - - -	Mar. - June
Oak *(Quercus alba)* - - - - - - - -	April - May
***Rabbit Bush** *(Franseria deltoidea)* - -	**April - May**
Olive *(Olea europaea)* - - - - - - -	April - May
Sheep Sorrel *(Rumex acetosella)* - -	May - July
Yellow Dock *(Rumex crispus)* - - -	May - July
***June Grass** (Blue Grass, *Poa pratensis*)	**May - Sept.**
***Bermuda Grass** *(Capriola dactylon)* -	**May - Sept.**
Lambs Quarters *(Chenopodium album)*	June - Sept.
Johnson Grass *(Sorghum halepense)* -	June - Oct.
***Annual Saltbush** *(Atriplex Wrightii)* -	**July - Sept.**
***Redroot Pigweed** *(Amaranthus retroflexus)* - - - - - - - - - - - -	**July - Sept.**
Sage Brush *(Artemisia tridentata)* - -	July - Sept.
Cocklebur *(Xanthium canadense)* - -	July - Sept.
***Russian Thistle** *(Salsola pestifer)* - -	**July - Sept.**
***Careless Weed** *(Amaranthus palmeri)* -	**July - Oct.**
Green Sage *(Artemisia campestris)* - -	July - Oct.
Pasture Sage *(Artemisia frigida)* - -	July - Oct.
Western Water Hemp *(Acnida tamariscina)* - - - - - - - - - - - -	July - Oct.
Marsh Elder *(Iva ciliata)* - - - - - -	Aug. - Oct.
Western Ragweed *(Ambrosia psilostachya)* - - - - - - - - - - - -	Aug. - Oct.
***Slender Ragweed** *(Franseria tenuifolia)*	**Sept. - Oct.**
Southwestern Ragweed *(Ambrosia aptera)* - - - - - - - - - - - -	Sept. - Oct.

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*Pollens of primary importance.

For index of States and other countries, see page 56.

Mugwort
(Artemisia vulgaris)

Sage Brush
(Artemisia tridentata)

Pacific States

(Nevada, California, Oregon, Washington)

(Canadian Province: British Columbia)

NAME	TIME OF BLOOM (Hay-Fever Season)
Cottonwood *(Populus macdougali)*	Feb. - April
***Black Walnut** *(Juglans nigra)* In California this is much grown as a shade and ornamental tree in the Sacramento, Napa and Russian River Valleys, where it is the most frequent cause of Spring hay-fever.	**Mar. - May**
Shad Scale *(Atriplex canescens)*	Mar. - June
Oak *(Quercus alba)*	April - May
Rabbit Bush *(Franseria deltoidea)*	April - May
Olive *(Olea europaea)*	April - May
Sweet Vernal Grass *(Anthoxanthum odoratum)*	April - July
***Orchard Grass** *(Dactylis glomerata)* Apparently orchard grass is one of the most active of grass pollens occurring throughout the State of California, especially in meadows and pastures of the North, and extending through Oregon and Washington.	**April - Aug.**
***Perennial Rye Grass** *(Lolium perenne)* This grass is most important from San Francisco northward, and in Oregon.	**May - July**
Sheep Sorrel *(Rumex acetosella)*	May - July
Yellow Dock *(Rumex crispus)*	May - July
***June Grass** (Blue Grass, *Poa pratensis*)	**May - Sept.**
***Bermuda Grass** *(Capriola dactylon)*	**May - Sept.**
***Timothy** *(Phleum pratense)* This is a very important cause of hay-fever in the northern and mountain counties of California, and in Oregon and Washington.	**June - Aug.**
***Redtop** *(Agrostis palustris)*	**June - Sept.**
Lambs Quarters *(Chenopodium album)*	June - Sept.
***Johnson Grass** *(Sorghum halepense)*	**June - Oct.**
Annual Saltbush *(Atriplex Wrightii)*	July - Sept.
***Redroot Pigweed** *(Amaranthus retroflexus)*	**July - Sept.**
***Sage Brush** *(Artemisia tridentata)*	**July - Sept.**
Cocklebur *(Xanthium canadense)*	July - Sept.
***Russian Thistle** *(Salsola pestifer)*	**July - Sept.**

(See next page)

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*Pollens of primary importance.

For index of States and other countries, see page 56.

NAME	TIME OF BLOOM (Hay-Fever Season)
***Mugwort** *(Artemisia vulgaris)* - - -	**July - Oct.**
In California, the mugwort is the most frequent cause of the Fall type of hay-fever.	
***Careless Weed** *(Amaranthus palmeri)* -	**July - Oct.**
Western Ragweed *(Ambrosia psilostachya)* - - - - - - - - - - - -	**Aug.** - Oct.
Slender Ragweed *(Franseria tenuifolia)*	**Sept.** - Oct.

The State of California may be sub-divided into three sections and the pollens of primary importance in these districts are as follows:

San Francisco Bay District

Black Walnut, Orchard Grass, Perennial Rye Grass, June Grass, Bermuda Grass, Redroot Pigweed, Sagebrush, Mugwort.

Sacramento and San Joaquin Valleys

Olive, Black Walnut, Orchard Grass, Perennial Rye Grass, June Grass, Bermuda Grass, Redtop, Johnson Grass, Redroot Pigweed, Mugwort.

Los Angeles-Pasadena District

Olive, Black Walnut, Orchard Grass, Perennial Rye Grass, June Grass, Bermuda Grass, Johnson Grass, Redroot Pigweed, Mugwort, Careless Weed.

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*Pollens of primary importance.

For index of States and other countries, see page 56.

Marsh Elder
(Iva ciliata)

Giant Ragweed
(Ambrosia trifida)

Southwestern Area

As pointed out by WATSON and KIBLER,[14] the hay-fever problem in the Southwest is different and more complex than in the other geographical sections of the country, owing to the difference in climatic conditions. Rabbit bush and shad scale are probably the most important plants causing the spring type of hay-fever. Bermuda grass causes spring, summer and fall type of hay-fever at altitudes up to 4,500 feet and June grass (Bluegrass) above that altitude. The principal cause of fall hay-fever is usually careless weed, but some seasons this is replaced by annual salt-bush. A less important cause of fall hay-fever is the slender ragweed.

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[14] WATSON, S. H., & KIBLER, C. S.: Etiology of Hay-Fever in Arizona and the Southwest, *Jour. A. M. A.*, Mar. 11, 1922, p. 719.

Hay-Fever in Other Countries

The important botanical groups of plants whose pollen is the direct cause of hay-fever in other countries of the world are as follows:

Africa

Amaranthus, Ambrosia, Artemisia, Atriplex, Chenopodium, Fraxinus, Gramineae, Juglans, Olea, Populus, Quercus, Salsola, Xanthium.

Alaska

Artemisia, Atriplex, Gramineae, Populus.

Australia

Amaranthus, Atriplex, Chenopodium, Gramineae, Olea.

British Isles

PLANT	TIME OF BLOOM
Sweet Vernal Grass *(Anthoxanthum odoratum)* - - - - - - - - - - -	May - June
June Grass *(Poa pratensis)* - - - - -	May - July
Cock's Foot, Orchard Grass *(Dactylis glomerata)* - - - - - - - - - - -	May - July
Sheep Sorrel *(Rumex acetosella)* - - -	May - July
Perennial Rye Grass *(Lolium perenne)* -	June - July
Yellow Dock *(Rumex crispus)* - - - -	June - Aug.
Timothy *(Phleum pratense)* - - - - -	June - Aug.
Redtop *(Agrostis palustris)* - - - - -	June - Sept.
Lambs Quarters *(Chenopodium album)* -	June - Oct.
Johnson Grass *(Sorghum halepense)* - -	July - Sept.
Redroot Pigweed *(Amaranthus retroflexus)* - - - - - - - - - - - - -	July - Oct.
Mugwort *(Artemisia vulgaris)* - - - -	Aug. - Oct.

Central America

Amaranthus, Atriplex, Artemisia, Ambrosia, Chenopodium, Gramineae, Iva, Quercus, Xanthium.

For botanical species of hay-fever plants whose pollen is used in preparing Pollen Antigens (Lederle), see pages 54-55.

Ragweed
(Ambrosia elatior)

Flowering top of Ragweed
(Ambrosia elatior)

China

PLANT	TIME OF BLOOM
Cottonwood *(Populus macdougali)* - -	March
June Grass *(Poa pratensis)* - - - - - -	Mar. - July
Ash *(Fraxinus species)* - - - - - -	April
Walnut *(Juglans species)* - - - - -	April
Oak *(Quercus species)* - - - - -	April
Sheep Sorrel *(Rumex acetosella)* - - -	April - July
Yellow Dock *(Rumex crispus)* - - - -	April - July
Bermuda Grass *(Capriola dactylon)* - -	May
Timothy *(Phleum pratense)* - - - - -	May
Redroot Pigweed *(Amaranthus retroflexus)* - - - - - - - - - - -	June - July
Lambs Quarters *(Chenopodium album)*	June - Sept.
Johnson Grass *(Sorghum halepense)* - -	July - Aug.

Hawaii

Amaranthus, Artemisia, Atriplex, Chenopodium, Franseria, Gramineae, Olea, Rumex, Xanthium.

New Zealand

Amaranthus, Ambrosia, Atriplex, Artemisia, Chenopodium, Gramineae, Juglans, Olea, Quercus, Rumex, Xanthium.

Of these, the Gramineae bloom as follows:

PLANT	TIME OF BLOOM
Sweet Vernal Grass *(Anthoxanthum odoratum)* - - - - - - - - - - -	Aug. - Oct.
June Grass *(Poa pratensis)* - - - - - -	Sept. - Oct
Perennial Rye Grass *(Lolium perenne)* -	Oct. - Nov.
Cock's Foot, Orchard Grass *(Dactylis glomerata)* - - - - - - - - - - - -	Oct. - Nov.
Redtop *(Agrostis palustris)* - - - - - -	Nov. - Dec.
Timothy *(Phleum pratense)* - - - - -	Dec. - Jan.

Philippine Islands

Amaranthus, Artemisia, Chenopodium, Gramineae, Quercus.

San Salvador

Amaranthus, Ambrosia, Gramineae.

For botanical species of hay-fever plants whose pollen is used in preparing Pollen Antigens (Lederle), see pages 54-55.

South America

Amaranthus, Ambrosia, Artemisia, Atriplex, Chenopodium, Franseria, Gramineae, Juglans, Olea, Quercus, Xanthium.

West Indies

Amaranthus, Ambrosia, Atriplex, Chenopodium, Fraxinus, Gramineae, Iva, Juglans, Olea, Xanthium.

Western Europe

(Norway, Sweden, Denmark, Holland, Germany, Belgium, France, Italy, Spain, Portugal)

PLANT	TIME OF BLOOM
Sweet Vernal Grass *(Anthoxanthum odoratum)*	April - July
Cock's Foot, Orchard Grass *(Dactylis glomerata)*	April - Sept.
Olive *(Olea europaea)* Especially in France, Italy, Spain and Portugal.	May - June
June Grass *(Poa pratensis)*	May - Aug.
Timothy *(Phleum pratense)*	May - Aug.
Redtop *(Agrostis palustris)*	May - Sept.
Perennial Rye Grass *(Lolium perenne)*	May - Oct.
Lambs Quarters *(Chenopodium album)*	June - Oct.
Bermuda Grass *(Capriola dactylon)*	July - Sept.
Johnson Grass *(Sorghum halepense)*	July - Sept.
Redroot Pigweed *(Amaranthus retroflexus)* Especially in France, Italy, Spain and Portugal.	July - Oct.
Mugwort *(Artemisia vulgaris)* Especially in France.	Aug. - Sept.

For botanical species of hay-fever plants whose pollen is used in preparing Pollen Antigens (Lederle), see pages 54-55.

Western Ragweed
(Ambrosia psilostachya)

Slender Ragweed
(Franseria tenuifolia)

CHAPTER VII

List of Pollen Antigens (Lederle)

Pollen Antigens (Lederle) and Pollen Diagnostics, for the diagnosis and treatment of hay-fever, prepared from the pollens of the hay-fever plants listed below are now available.

	ILLUSTRATED ON PAGE
Annual Salt Bush *(Atriplex Wrightii)*	25
Arizona Ash *(Fraxinus toumeyi)*	5
Arizona Walnut *(Juglans major)*	
Bermuda Grass *(Capriola dactylon)*	15
Black Walnut *(Juglans nigra)*	4
Careless Weed *(Amaranthus palmeri)*	28
Cocklebur *(Xanthium canadense)*	31
Cottonwood *(Populus macdougali)*	3
Grass, Bermuda *(Capriola dactylon)*	15
Grass, Johnson *(Sorghum halapense)*	20
Grass, June *(Poa pratensis)*	14
Grass, Orchard *(Dactylis glomerata)*	10
Grass, Perennial Rye *(Lolium parenne)*	13
Grass, Redtop *(Agrostis palustris)*	19
Grass, Sweet Vernal *(Anthoxanthum odoratum)*	9
Grass, Timothy *(Phleum pratense)*	18
Green Sage *(Artemisia campestris)*	37
Giant Ragweed *(Ambrosia trifida)*	43
Johnson Grass *(Sorghum halapense)*	20
June Grass *(Poa pratensis)*	14
Lambs Quarters *(Chenopodium album)*	21
Marsh Elder *(Iva ciliata)*	43
Mountain Cedar *(Juniperus sabinoides)*	2
Mugwort *(Artemisia vulgaris)*	40
Oak *(Quercus alba)*	7
Olive *(Olea europaea)*	

(List continued on next page)

See tables on pages 30 to 42 for relative importance of the hay-fever plants in various sections of the country.

	ILLUSTRATED ON PAGE
Orchard Grass *(Dactylis glomerata)*	10
Pasture Sage *(Artemisia frigida)*	37
Perennial Rye Grass *(Lolium perenne)*	13
Rabbit Bush *(Franseria deltoidea)*	8
Ragweed *(Ambrosia elatior)*	46
Ragweed, Giant *(Ambrosia trifida)*	43
Ragweed, Slender *(Franseria tenuifolia)*	49
Ragweed, Southwestern *(Ambrosia aptera)*	53
Ragweed, Western *(Ambrosia Psilostachya)*	49
Redroot Pigweed *(Amaranthus retroflexus)*	26
Redtop *(Agrostis palustris)*	19
Russian Thistle *(Salsola pestifer)*	27
Sage Brush *(Artemisia tridentata)*	40
Sage, Green *(Artemisia campestris)*	37
Sage, Pasture *(Artemisia frigida)*	37
Shad Scale *(Atriplex canescens)*	6
Sheep Sorrel *(Rumex acetosella)*	16
Slender Ragweed *(Franseria tenuifolia)*	49
Southwestern Ragweed *(Ambrosia aptera)*	53
Spiny Amaranth *(Amaranthus spinosus)*	22
Sweet Vernal Grass *(Anthoxanthum odoratum)*	9
Timothy *(Phleum pratense)*	18
Walnut, Arizona *(Juglans major)*	
Walnut, Black *(Juglans nigra)*	4
Western Ragweed *(Ambrosia psilostachya)*	49
Western Water Hemp *(Acnida tamariscina)*	29
Yellow Dock *(Rumex crispus)*	17

Packages

All of the Pollen Antigens (Lederle) in the preceding list are supplied in the following packages:

Complete Series (Nos. 1 to 15)	$15.00
Series A, 5 doses (Nos. 1 to 5)	5.00
Series B, 5 doses (Nos. 6 to 10)	5.00
Series C, 5 doses (Nos. 11 to 15)	5.00
Series D, 5 doses (No. 16)	5.00
3 Diagnostic Tests	Gratis

See tables on pages 30 to 42 for relative importance of the hay-fever plants in various sections of the country.

The Series A, B and C packages are provided for convenience in the treatment, during the pollinating season, of persons suffering with symptoms of hay-fever and for whom the full 15 doses may not be required. Whenever these Series packages are used, Series A should be used to begin the treatment. Series B and C ought to follow the regular sequence of dosage and should not be used to begin the treatment.

The Series D package is provided for additional treatment of persons who are less sensitive to pollen protein and who are, therefore, more refractory to the desensitizing treatment; also when higher dosage than is contained in the complete series of 15 doses is desired.

NOTE: The strength of the various doses in the above listed packages will be found in the table on page 24.

Southwestern Ragweed
(Ambrosia aptera)

Botanical Species of Hay-Fever Plants With Their Common English Names

Pollens from the following species are used in the preparation of Pollen Antigens (Lederle):

	ILLUSTRATED ON PAGE
Acnida tamariscina (Western Water Hemp) .	29
Agrostis palustris (Redtop, Whitetop, Fiorin, White Bent, Herd's Grass)	19
Amaranthus palmeri (Careless Weed, Bleedo) .	28
Amaranthus retroflexus (Redroot Pigweed, Rough Pigweed, Chinaman's Greens)	26
Amaranthus spinosus (Spiny Amaranth, Soldier Weed)	22
Ambrosia aptera (Southwestern Ragweed) . .	53
Ambrosia elatior (Ragweed, Common Ragweed, Roman Wormwood, Hogweed, Bitterweed, Wild Tansy, Carrotweed, Stammerwort)	46
Ambrosia psilostachya (Western Ragweed, Perennial Ragweed)	49
Ambrosia trifida (Giant Ragweed, Great Ragweed, Kinghead, Crownweed, Horseweed, Horse Cane, Big Bitterweed)	43
Anthoxanthum odoratum (Sweet Vernal Grass) .	9
Artemisia campestris (Green Sage, Field Sagewort)	37
Artemisia frigida (Pasture Sage, Prairie Sagewort)	37
Artemesia tridentata (Sage Brush, Sage Wood, Mountain Sage)	40
Artemisia vulgaris (Mugwort, Felon Herb, Sailor's Tobacco)	40
Atriplex canescens (Shad Scale, Wingscale) . .	6
Atriplex wrightii (Annual Saltbush)	25
Capriola dactylon (Bermuda Grass, Wire Grass, Devil Grass)	15

(List continued on next page)

	ILLUSTRATED ON PAGE
Chenopodium alum (Lambs Quarters, White Goosefoot, Smooth Pigweed, Mealweed) . .	21
Dactylis glomerata (Orchard Grass, Cock's Foot)	10
Franseria deltoidea (Rabbit Bush)	8
Franseria tenuifolia (Slender Ragweed) . . .	49
Fraxinus toumeyi (Arizona Ash)	5
Iva ciliata (Marsh Elder)	43
Juglans major (Arizona Walnut)	
Juglans nigra (Black Walnut)	4
Juniperus sabinoides (Mountain Cedar) . . .	2
Lolium perenne (Perennial Rye Grass, Australian Rye Grass)	13
Olea europaea (Olive)	
Phleum pratense (Timothy)	18
Poa pratensis (June Grass, Kentucky Bluegrass)	14
Populus macdougali (Cottonwood)	3
Quercus alba (Oak)	7
Rumex acetosella (Sheep Sorrel, Field Sorrel, Horse Sorrel, Sourweed)	16
Rumex crispus (Yellow Dock, Curled Dock) . .	17
Salsola pestifer (Russian Thistle, Russian Cactus, Russian Tumbleweed, Tumbling Thistle)	27
Sorghum halapense (Johnson Grass, Means Grass, Syrian Grass, Aleppo Grass, Egyptian Grass, False Guinea Grass, Morocco Millet, Arabian Millet, Evergreen Millet)	20
Xanthium canadense (Cocklebur, Clotbur, Sheepbur, Buttonbur, Ditchbur)	31

Index of States and Other Countries

By referring to the pages indicated below one may ascertain the pollens that cause hay-fever in the United States and other countries.

	PAGE
Africa	45
Alabama	33
Alaska	45
Alberta	38
Arizona	39
Arkansas	33
Australia	45
Belgium	48
British Columbia	41
British Isles	45
California	41
California (Southeastern)	39
Canadian Provinces,	30, 35, 36, 38, 41
Central America	45
China	47
Colorado	38
Connecticut	30
Delaware	32
Denmark	48
Florida	33
France	48
Georgia	33
Germany	48
Hawaii	47
Holland	48
Idaho	38
Illinois	35
Indiana	35
Iowa	36
Italy	48
Kansas	36
Kentucky	35
Louisiana	33
Maine	30
Manitoba	36
Maryland	32
Massachusetts	30
Michigan	35
Minnesota	36
Mississippi	33
Missouri	36
Montana	38
Nebraska	36
Nevada	41
New Brunswick	30
New Hampshire	30
New Jersey	32
New Mexico	39
New York	32
New Zealand	47
North Carolina	33
North Dakota	36
Norway	48
Nova Scotia	30
Ohio	35
Oklahoma	33
Ontario	35
Oregon	41
Pennsylvania	32
Philippine Islands	47
Portugal	48
Prince Edward Island	30
Quebec	30
Rhode Island	30
San Salvador	47
Saskatchewan	38
South America	48
South Carolina	33
South Dakota	36
Spain	48
Sweden	48
Tennessee	33
Texas	33
Texas (Southwestern)	39
Utah	38
Vermont	30
Virginia	32
Washington	41
West Indies	48
West Virginia	32
Western Europe	48
Wisconsin	35
Wyoming	38

McKennan Drug Co.
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